Restoring federally endangered harperella along waterways in the National Capital Region

By Elizabeth Fortson Wells and Dianne Ingram

IRREVOCABLE CHANGES in the hydrologic cycles of eastern rivers and streams have imperiled harperella (*Ptilimnium nodosum*), a small member of the carrot family. Federally listed since 1988, harperella is the only endangered plant species in the National Capital Region. Over the past 90 years, harperella populations have been located, and subsequently extirpated, three times in the Chesapeake and Ohio Canal National Historical Park (Maryland). The park, which provides historical and potential habitat for harperella, experiences annual floods that may cause two extreme changes: "founder" events and extinction events. That is, new harperella populations are established while local populations become extinct. These dynamic founder-extinction events make watershed-level conservation necessary for this species.

In 2001, park managers initiated restoration and recovery efforts for harperella by surveying for extant populations and collecting seeds. In 2002 the lead scientist on the restoration project, Dr. Elizabeth Wells, began germination and seedling-growth experiments using harperella seeds collected from neighboring lands. During these successful experiments, germination took place at moderate temperatures over two to three weeks.

In summer 2003, Wells began characterizing and searching for suitable riparian habitat to reintroduce harperella populations. Harperella has very particular site requirements, specifically gravel bars that have full sun during most of the day, which few areas on parkland meet. Gravel bars simultaneously offer protection from severe erosion while receiving occasional scouring events. The plant requires a narrow range of water depths (neither too deeply submerged nor too high above the water) during critical parts of the growing season. As disturbed and scoured areas, the bars also provide suitable habitat for exotic species.

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The Exotic Plant Management Team from the National Capital Region has been instrumental in this restoration effort. At selected planting sites, team members mapped vegetation, classified species, and helped prepare the sites for planting by removing aggressive exotics such as Japanese knotweed (*Polygonum cuspidatum*).

During periods of low water in July and August 2003, which corresponded to natural seed drop by harperella in the area, Wells planted viable seeds into five plots at selected sites along the Potomac River. Extensive flooding occurred within a few days after planting and possibly washed away the seeds as no seedlings sprouted in the plots. Therefore, in late October, restoration efforts required transplanting five seedlings from the germination experiments into each plot and individually staking the seedlings with biodegradable cloth.

The small white clusters of carrotlike flowers show harperella in full bloom on a site near the Chesapeake and Ohio Canal National Historical Park. Harperella is the only federally endangered plant species in the National Capital Region.

Dr. Elizabeth Wells (above left) and her assistant, Charlotte Marvil, lay out a plot for planting harperella on a gravel bar beside the Potomac River in C&O Canal National Historical Park. The plots are marked with 14-inch (35-cm) long spikes and biodegradable flagging tape, using orange twine to crisscross the space about 8 inches (20 cm) above the surface.

Scientists do not fully understand the consequences of flooding during various stages of harperella's life cycle. Harperella tolerates or even requires some flooding during the winter and spring to deter weedy competitors from establishing populations on the gravel bars. However, flooding during seed maturation in late summer and autumn, when flower and fruit production occurs, has mixed consequences. By establishing and augmenting new populations downstream, minor floods of low volume appear to have significant, beneficial roles in seed dispersal in autumn. However, major floods of extended duration during autumn appear to obliterate the seeds. The typical three- or four-month period of flowering and fruiting from August until frost usually allows many opportunities for seed dispersal. Unfortunately, this year was notable for frequent massive floods, including the September 18, 2003, flood that accompanied Hurricane Isabel. Field observations in 2003 suggest that harperella germination and establishment do not occur when water levels are unusually high, whereas vegetative reproduction may be favored during periods of extended flooding. Experiments are planned to test vegetative reproduction in harperella in 2004. ■

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